



CHAPTER 1

AVIATION ACTIVITY AND CAPACITY
IN THE NATIONAL AIRSPACE SYSTEM

1 Aviation Activity and Capacity in the National Airspace System

The National Airspace System (NAS) has several different types of traffic, including commercial passenger and cargo traffic, general aviation traffic, and military operations. Each is an important part of the activity in the NAS and places different demands on the air traffic control system. This chapter summarizes trends in aviation activity and discusses FAA forecasts to FY 2013.

1.1 Activity and Capacity

Aviation activity is a reflection of the demand on airports and the air traffic control system. The FAA measures activity primarily in terms of passenger enplanements and aircraft operations. Capacity is an expression of the system's ability to accommodate the demand, which the airlines and the FAA measure differently. The airlines measure the capacity they provide in terms of meeting the needs of their customers, passengers and shippers. They track summary statistics such as available seat miles for passengers and available ton-miles for shippers. The FAA has traditionally measured capacity indirectly by tracking flight delays. Delay is an indicator that capacity is temporarily (or chronically) insufficient. In recent years, the FAA has improved its measures of capacity through the airport benchmark project and the development of additional measures, such as airport efficiency rates.

1.2 Aviation Activity in the United States

Aviation activity is generated by a number of diverse participants: large commercial air carriers, regional carriers, commuter airlines, on-demand air taxis, all-cargo airlines, the military and general aviation operators. Each user group places different demands on the airports and the air traffic control system, because the magnitude, the location, and the timing of their activities vary. All commercial activity is conducted under the control of the FAA's air traffic control system, whether the operators are large commercial jets, regional jets, cargo carriers, commuters, or air taxis. In contrast, the majority of general aviation activity takes place at small airports far from major urban centers and may have little or no contact with the air traffic control system. Much of the contact that general aviation pilots do have is with the specialists at flight service stations rather than with air traffic controllers. However, general aviation does have a significant impact at some major airports, as noted below (see section 1.2.4). Military airports support most of the military traffic and the military's own air traffic control system handles most of their terminal operations.

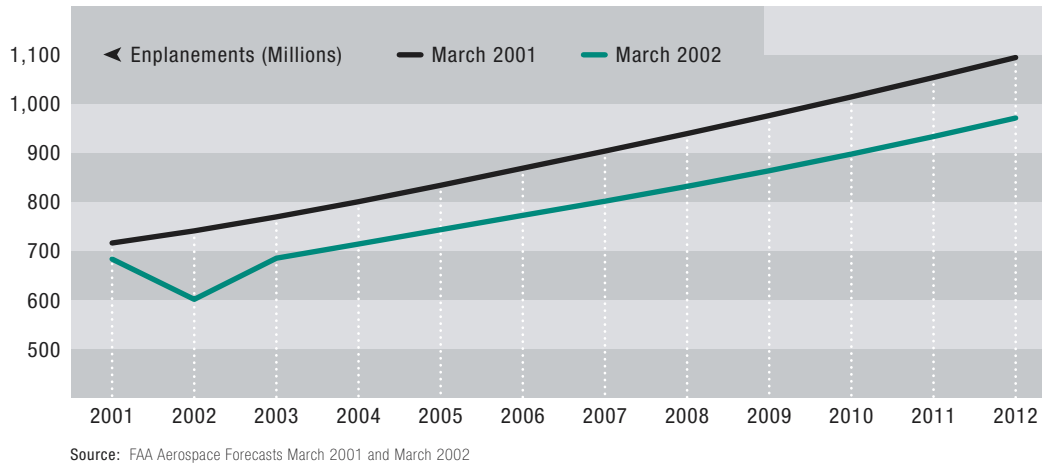
1.2.1 Enplanements and Operations at U.S. Airports

In FY 2001, passenger enplanements decreased slightly from the previous year, from 695.7 million to 682.5 million (13.2 million or 1.8 percent fewer), marking the first annual decline in enplanements since the Gulf War in 1990. The economy was weakening before the events of September 11, but through August enplanements were running near those of the previous year. The temporary shutdown of the NAS and the sharp drop in traffic after September 11 resulted in a decline for the entire year. Enplanements for September 2001 were approximately 34.2 million, 19.9 million (or 38 percent) less than the 52.1 million of September 2000.

Every year, the FAA prepares a 12-year forecast of aviation activity and presents it at the FAA Aerospace Forecasts in March. Figure 1-1 compares the March 2002 forecast for

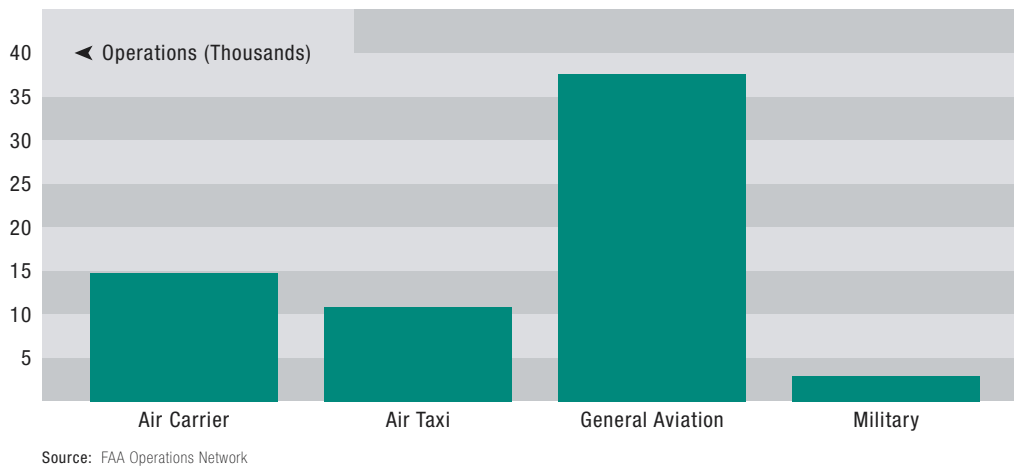
passenger enplanements to the March 2001 forecast. Although the FAA's new forecast shows steady growth resuming in FY 2003, it does not project enplanements reaching the previous forecast for FY 2002 (about 740 million) until FY 2005, a delay of 3 years; similarly, the new forecast postpones reaching the 1 billion level by 3 years, from FY 2010 to FY 2013. The gap between the lines shows the long-term impact of September 11, which translates into lost revenue for the airlines (through tickets sold), the aviation trust fund (through excise taxes) and the airports (through PFCs).

Figure 1-1 FAA Forecasts of Passenger Enplanements, March 2002 vs. March 2001



The FAA tracks aircraft operations (take-offs plus landings) for four classes of users: air carriers, air taxis/commuters, general aviation operators, and the military. Of these, only air carriers and air taxis/commuters generate any passenger enplanements, but general aviation accounts for the largest number of operations. Figure 1-2 shows the distribution of aircraft operations by user group for FY 2001.

Figure 1-2 Aircraft Operations by User Group for FY 2001



Aircraft operations for all users declined by 3.6 percent in FY 2001, going from 68.7 million to 66.2 million operations, compared to an earlier forecast for an increase to 71.0 million. However, the rate of change for the four user groups varied significantly: air carrier operations decreased by 2.6 percent and air taxi/commuter operations increased by 1.1 percent, while general aviation operations decreased by 5.7 percent and military operations increased by 0.9 percent. As with enplanements, the real impact of September 11 was only partially shown in FY 2001. For the month of September 2001 the number of operations was only 4.2 million, compared to the previous year's 5.8 million operations. Total operations decreased from 67.7 million in 2000 to 65.5 million in FY 2001.

The FAA forecasts aircraft operations to increase significantly by 2013, reaching 81.7 million for all users, an increase of 23.5 percent over the 2001 level. But as with passenger enplanements, the forecast was adjusted downward after September 11. The current forecast calls for a decrease in operations for FY 2002 (from 66.2 million to 64.4 million) and a resumption of growth thereafter.

The decrease in the projected number of aircraft operations in the near-term and the lower forecasts for the longer term varies by user group. The decreases are significant and long lasting for air carriers and general aviation, but air taxis/commuters and the military actually show slight increases in operations.

1.2.2 Enplanements and Operations at the Busiest U.S. Airports

Because of the concentration of commercial traffic at the largest airports and the dispersion of general aviation operations, the 100 busiest airports, as ranked by passenger enplanements, accounted for more than 96 percent of passenger enplanements but only 42 percent of aircraft operations in FY 2001.

Passenger enplanements for the 100 busiest airports (ranked by CY 2000 enplanements), by both fiscal and calendar year for the past 3 years are shown in Appendix B-1. The FAA forecasts and rates of growth for these same airports for FY 2013 are presented in Appendix B-2.

Aircraft operations for all user groups for the same 100 airports (ranked by CY 2000 enplanements), by both fiscal and calendar year for the past 3 years are shown in Appendix B-3. The FAA forecast and rates of growth for those airports for FY 2013 are presented in Appendix B-4.

1.2.3 Air Cargo Activity

Cargo traffic, like all other aviation activity, has been depressed by both the aftermath of the September 11 and the economic downturn. However, recent reports suggest a significant year-over-year recovery in air cargo volumes, indicating that the slump may be ending and that more normal growth will resume. Air cargo volume is often considered to be a leading indicator of economic growth.

The summary data for cargo activity collected by the DOT and published by the FAA are in terms of revenue ton-miles (RTMs), or one ton of cargo flown for one mile. For FY 2001, total cargo activity was approximately 28.5 billion RTMs, a decline of 3.3 percent from 30.1 billion in FY 2000. Cargo is carried aboard passenger aircraft and all-cargo aircraft. In FY 2001, passenger carriers flew 11.1 billion RTMs (39 percent) and all-cargo airlines flew 17.4 billion RTMs (61 percent). Total cargo traffic as measured in RTMs, is

dominated by the two large all cargo airlines, FedEx, with 26 percent of the market, and United Parcel Service (UPS), with 15 percent of the market.

Cargo traffic at individual airports is measured in tons loaded and unloaded. Not surprisingly, the airports where FedEx and UPS have hubs for their overnight package service are among the busiest cargo airports. Memphis, the main base for FedEx, was the busiest cargo airport in CY 2001 and Louisville, the main hub for UPS, was the fifth busiest cargo airport. The ten busiest cargo airports and the change in the tonnage loaded and unloaded in CY 2001 are shown in figure 1-3 below.

Figure 1-3 Busiest Cargo Airports for CY 2001

Airport (ID)	Metric Tons	Change from CY 2000
Memphis International (MEM)	2,631,631	5.7%
Ted Stevens Anchorage International (ANC)	1,873,750	3.9%
Los Angeles International (LAX)	1,774,402	(13.0%)
Miami International (MIA)	1,639,760	0.0%
Louisville International (SDF)	1,469,837	(3.2%)
New York John F. Kennedy International (JFK)	1,430,727	(21.3%)
Chicago O'Hare International (ORD)	1,299,628	(11.5%)
Indianapolis International (IND)	1,115,272	(4.3%)
Newark Liberty International (EWR)	795,584	(26.4%)
Dallas-Fort Worth International (DFW)	784,085	(13.4%)

Source: Airports Council International–North America

1.2.4 General Aviation Activity

General aviation (GA) includes all segments of civil aviation except commercial air carriers (air carriers, commuters, air taxis, charters, and unscheduled traffic). The majority of U.S. airports handle only GA traffic. Many of these are small, rural airports without an air traffic control tower. Flights to and from these airports typically have little or no contact with the FAA's air traffic control system and don't contribute to airport or airspace congestion. Nonetheless, in FY 2001, almost 30 million GA operations took place at airports with air traffic control towers, over 10 percent of total aircraft operations at those airports. Handling a mix of air carrier and GA aircraft operations requires controllers to carefully segregate aircraft types to accommodate different aircraft speeds and to avoid wake vortex incidents.

General aviation operations have been severely affected by the events of September 11, but the impact has been very uneven. In fact, for both fiscal and calendar year, total GA operations were only slightly down. However, operations at the busier commercial aviation airports were down significantly because of the restrictions placed on GA after September 11. Perhaps the most significant restriction is the total ban of all general aviation operations at Reagan Washington National Airport. Before September 11, DCA averaged about 5,000 GA operations per month, some 17.5 percent of all operations. Figure 1-4 lists the airports with the largest number of general aviation operations. Six of these airports are primary commercial service airports, while four are relievers.

Figure 1-4 Busiest General Aviation Airports for FY 2001

Airport (ID)	City/State	Airport Type	Operations
Van Nuys (VNY)	Van Nuys, CA	Reliever	433,590
Orlando-Sanford International (SFB)	Orlando, FL	Primary	385,247
Daytona Beach International (DAB)	Daytona Beach, FL	Primary	362,506
Long Beach-Daugherty Field (LGB)	Long Beach, CA	Primary	344,937
Phoenix-Deer Valley Municipal (DVT)	Phoenix, AZ	Reliever	332,400
Denver Centennial (APA)	Denver, CO	Primary	327,309
E.A. Love Field (PRC)	Prescott, AZ	Primary	313,109
John Wayne-Orange County (SNA)	Santa Ana, CA	Primary	284,343
Oakland-Pontiac (PTK)	Pontiac, MI	Reliever	283,763
Boeing Field-King County International (BFI)	Seattle, WA	Reliever	269,106

Source: FAA Operations Network

General aviation also has a significant presence at the busiest commercial service airports. GA traffic accounted for 8.2 percent of total aircraft operations at the 31 large-hub airports in FY 2001. As shown in Figure 1-5, the actual percentage of GA operations varied from just 1.2 percent at Seattle-Tacoma to 27.4 percent at Ft. Lauderdale.

Figure 1-5 GA Operations at the Large-Hub Airports for FY 2001

Airport (ID)	General Aviation Operations	Total Operations	% General Aviation Operations
Ft. Lauderdale-Hollywood International (FLL)	81,993	299,773	27.4%
Honolulu International (HNL)	85,185	339,987	25.1%
Minneapolis-St. Paul International (MSP)	125,483	512,102	24.5%
Chicago-Midway (MDW)	58,026	280,527	20.7%
Salt Lake City International (SLC)	72,860	363,682	20.0%
Las Vegas McCarran International (LAS)	80,377	513,679	15.6%
Miami International (MIA)	68,631	489,058	14.0%
Washington Dulles International (IAD)	57,692	430,082	13.4%
Philadelphia International (PHL)	60,966	475,577	12.8%
Charlotte-Douglas International (CLT)	48,151	471,731	10.2%
Phoenix Sky Harbor International (PHX)	63,921	627,561	10.2%
Detroit Metropolitan Wayne County (DTW)	51,618	540,966	9.5%
Baltimore-Washington International (BWI)	26,992	328,428	8.2%
Orlando International (MCO)	26,686	343,457	7.8%
Greater Cincinnati International (CVG)	28,032	390,306	7.2%
San Diego International Lindberg Field (SAN)	13,960	213,080	6.6%
George Bush International (IAH)	25,331	489,987	5.2%
Boston Logan International (BOS)	25,262	499,474	5.1%
Greater Pittsburgh International (PIT)	22,169	452,696	4.9%
San Francisco International (SFO)	19,858	407,040	4.9%
Lambert St. Louis International (STL)	20,949	486,503	4.3%
Newark Liberty International (EWR)	16,437	462,202	3.6%
Denver International (DEN)	14,512	526,204	2.8%

Figure 1-5 Continued

Airport (ID)	General Aviation Operations	Total Operations	% General Aviation Operations
New York LaGuardia (LGA)	10,797	404,206	2.7%
Chicago O'Hare International (ORD)	24,496	927,896	2.6%
New York John F. Kennedy International (JFK)	8,156	340,459	2.4%
Los Angeles International (LAX)	17,259	783,160	2.2%
Dallas-Fort Worth International (DFW)	13,144	835,748	1.6%
Hartsfield Atlanta International (ATL)	13,558	898,899	1.5%
Seattle-Tacoma International (SEA)	5,110	423,903	1.2%
Total Large-Hub Airports	1,212,003	14,863,673	8.2%

Source: FAA Operations Network

1.2.5 Military Operations

Military operations account for a small fraction of the activity at the nation's commercial airports, but a significant amount of U.S. airspace is designated as special use airspace reserved for military operations. Special use airspace is available to commercial or GA operations only when the military opens a particular airspace area to non-military operations for a specified time period. Special use airspace and procedures for sharing that airspace are discussed in greater detail in Chapter Six and Appendix A. Following September 11, the deployment of military aircraft in civilian airspace has increased, as patrols have been instituted to provide greater security.

1.3 Other Sources of Commercial Aviation Activity

Additional sources of commercial aviation activity may have a significant long-term impact of the demand for airport and airspace capacity. The most important of these trends is the continuing growth in the use of regional jets to replace both mainline jets (primarily operated by large commercial carriers) and turboprops (primarily operated by regional airlines), which affects the mix of aircraft at airports and in en route and terminal airspace. The large aircraft manufacturers, Airbus and Boeing, although cutting production of current models this year, are continuing development of new models.

1.3.1 Regional Jets

Regional jets (RJs) are turbo-fan-powered airplanes, generally seating 70 or fewer passengers, with certain models seating up to 100 passengers. Operationally, regional jets are positioned between large turboprops, such as the Saab 340 and the Bombardier Dash-8, and narrow body mainline jets, such as the B-737 and the MD-80.

The replacement of turboprops has been a consistent trend over the years because of travelers' preference for jets. Recently, RJs have been replacing mainline jets on some routes as airlines have tried to adjust capacity in a period of declining traffic. The ability of regional jets to replace both turboprops and mainline jets has enabled them to maintain a strong market position in spite of the downturn in commercial aviation since September 11.

Over the past decade, the regional jet market has grown impressively. In 1991, three regional airlines operated fewer than 20 RJs. By 2001, 15 regional airlines operated 666

regional jets. In that same period, the number of regional jet departures grew from a little more than 9,100 (less than one percent of industry operations) to over 1.2 million in 2001 (32 percent).

Most aviation analysts, and the FAA, expect the size of the regional jet fleet, the number of regional jet operations, and the number of airports they serve to grow rapidly. In FY 2001, the commuter/regional airlines enplaned 80 million passengers. The FAA projects their system-wide enplanements (which includes both turboprop and jet operations) to increase at an average annual rate of 5.5 percent through FY 2013.

Most of the carriers' growth will come from an increase in the use of regional jets. The proportion of the carriers' traffic provided by regional jets continues to increase as they replace turboprops with regional jets and as larger regional jets, with seating capacity exceeding 70, are introduced. The increased use of regional jets is also expected to increase the average seating capacity of the regional fleet and the average passenger trip length for these carriers. The FAA forecasts that the number of regional jets in service will increase from 2,427 in FY 2001 to 4,457 in FY 2013.

The continuing increase in the number of RJs may ultimately have a negative impact on air traffic flow and operations because of the increased volume on jet routes to/from airports and at higher en route altitudes. At the same time, certain airports that have built runways for turboprop aircraft may find those facilities underused.

1.3.2 New Transport Aircraft

Each of the major aircraft manufacturers has its own proposal for a radically new aircraft, the A380, a new large aircraft (NLA) for Airbus and the sonic cruiser for Boeing. Each manufacturer's aircraft plan is based on a different outlook for the future of the industry. Airbus anticipates there will be a need for a much larger aircraft that will serve to connect busy and congested hubs, where landing slots will be at a premium. Boeing, while conceding the demand for a small number of such very large aircraft, projects a greater demand for point-to-point service, especially in long distance markets. However Boeing is re-evaluating which model of aircraft will be more successful in meeting that demand.

Whatever the long-term outcome is, none of these aircraft will be put into operation for several years and then only a few aircraft at a time. The first passenger version of the A380 is scheduled for delivery in 2006, followed by a freighter, the A380F, in 2008. Boeing has not yet committed to the production of the sonic cruiser and recently has begun considering applying much of the sonic cruiser's new technology to a fuel-efficient conventional jet.

The A380 will seat 555 passengers in its original configuration, while the A380F will be capable of carrying 330,000 pounds of cargo. Airbus has approximately 95 firm orders for the two aircraft to date. Fourteen U.S. airports expect to provide A380/A380F service by 2010.⁴

In February 2002, the General Accounting Office published its survey of those airports' estimates of the costs of the modifications required to serve the A380/A380F. The 14 airports collectively estimated that it would cost more than \$2 billion to make the

⁴ The 14 airports are Los Angeles, Chicago O'Hare, New York Kennedy, Anchorage, San Francisco, Dallas-Fort Worth, Indianapolis, Washington Dulles, Memphis, Atlanta, Houston Intercontinental, Orlando, Miami, and Denver.

required modifications. Airbus responded that many of the airports' estimates were high because of rough and inconsistent analyses and the inclusion of certain costs that are not NLA-specific. Airbus estimated that the required changes would cost only some \$520 million. An unresolved issue that contributes to the variation in the cost estimates is whether, and under what conditions, operational modifications such as restricting the NLA to certain taxiways could be employed to avoid large expenditures on airport upgrades.

The FAA's New Large Aircraft Facilitation Group, which is composed of representatives from the FAA, aircraft manufacturers, airports, and various aviation industry associations, has been active in assessing the potential impact of the A380 or other large aircraft. Its work has included evaluations of the structural and/or operational modifications that might be required to accommodate these aircraft at U.S. airports and working with the International Civil Aviation Organization to ensure the development of harmonious standards.

In addition to the work of the NLA Facilitation Group, the Office of System Capacity recently conducted a ground movement analysis at Memphis International Airport to determine whether the operation of an NLA would adversely impact the operation of other aircraft at that airport. The study found that there would be no significant impact. A similar study is being conducted at Kennedy International Airport.